REMARKS

After entry of this Amendment, claims 1-30 are pending in the application. Claims 19-30 have been added in this amendment. Claims 1, 9-10, and 18 have been amended to more particularly point out and distinctly claim the subject matter which applicants regard as the invention. Reconsideration of the application as amended is requested.

In the office action dated March 13, 2003, the Examiner objected to the title as not descriptive. The title of the present application has been amended to be more descriptive. Entry of the amended title in the present application is requested.

The Examiner objected to the Abstract of the Disclosure as having only 50 words. The Abstract of the Disclosure has been amended to be 88 words in length. Entry of the amended Abstract of the Disclosure is requested.

The Examiner objected to the drawings as failing to illustrate the means for compensating the sensed characteristic of the output optical signal containing electric field information corrupted by temperature variations as recited in Claim 1. It is submitted that a substitute drawing of Figure 11 is submitted with this amendment to illustrate the compensating means as requested by the Examiner. Entry of the substitute drawing of Figure 11 is requested.

Claims 1, 2, 4, 7-8, 10-11, 13, and 16-17 stand rejected under 35 U.S.C. §102(b) as being anticipated by Erickson et al. (U.S. Pat. No. 4,002,975). It is submitted that the present invention as recited in claims 1, 2, 4, 7-8, 10-11, 13, and 16-17 is not anticipated, taught or rendered obvious by the Erickson et al reference. In particular, the physical phenomena used for the temperature measurement and the temperature compensation of electric field information in the present invention is totally different than the fundamental basis used in any of the other techniques in the cited patents. The bandgap modulation used in the present invention is never mentioned in any of the cited patents, and the joint electric-field/thermal measurement capability of present invention is therefore not anticipated, taught or rendered obvious. The means used by the other cited patents are very different from the bandgap modulation of the present

invention, i.e., the cited patents use physical phenomena unrelated to bandgap modulation. In Erickson, the correction requires the proximity to the probe of a heat source controlled by an error signal, while in the present invention, a value associated with the attenuation of a part of the optical return signal, that does not contain information on the electric field, is used to correct the size of the signal that does contain information on the electric field. In other words, the Erickson et al reference does not teach or suggest measuring the electric field and temperature jointly with the same sensor or probe. With respect to claims 4 and 13, while the Erickson patent does describe sensitivity limits, it does not describe absolute field measurements. The information in the tables of Erickson has no relevance to absolute field measurements. The Erickson tables give material properties such as electro-optic coefficients in meters/volt, but the tables indicate nothing about absolute field values of the electric field to be measured compensated for temperature variations of the probe. With respect to claims 7 and 16, while compared to Erickson the present invention does have a temperature-measurement means, the present invention is not for measuring the temperature of the optical element (i.e., the probe) in order to compare it with a predetermined temperature level to derive an error signal as disclosed in Erickson et al. Erickson et al uses a thermo-mechanical apparatus that must also change the temperature of the electric-field sensor through an associated component in order to act as a temperature sensor, rather than an optoelectronic technique that uses bandgap modulation in the same material used to sense the electric field as disclosed in the present invention. With respect to claim 8 and 17, the way in which the present invention simultaneously measures electric field and temperature, while being providing compensation for temperature variation is based on different physical principles (as described extensively above). Therefore the present invention is not anticipated, taught, or rendered obvious by the Erickson et al reference, taken singularly or in any permissible combination. Reconsideration of the Examiner's rejection is requested.

Claims 1, 2, 4-11, and 13-18 stand rejected under 35 U.S.C. §102(b) and §102(e) as anticipated by Bosselmann et al (U.S. Pat. No.

5,895,912). It is submitted that the present invention as recited in claims 1, 2, 4-11, and 13-18 is not anticipated, taught or rendered obvious by the Bosselmann et al reference. As compared with Bosselmann et al, the present invention uses a totally different technique to derive a measured signal independent of temperature. The temperature effects in Bosselmann et al are caused by a temperature-dependent linear birefringence of the probe, rather than by a temperature-dependent semiconductor bandgap as in the present invention. The temperature-dependent linear birefringence must be implemented in a model that is applied to the signal from the probe in order to arrive at what Bosselmann calls a "measured signal". With respect to claims 4 and 13, the Bosselmann et al patent does not describe absolute field measurements. With respect to claims 5 and 14, there is no mention in any of the patents about stabilizing electric field drift. With respect to claims 6 and 15, the signal in the present invention is filtered in order to distinguish the electric-field and thermal information. The present invention has an optical beam that carries 1) information about both the electric field and temperature at a modulation frequency component of f1 MHz; and 2) information about temperature only at a modulation frequency component of f2 MHz. The information at f2 MHz can be used to compensate for temperature effects on the electric-field information at the f1 MHz frequency component. In contrast, the Bosselmann et al reference creates an intensity-normalized signal that requires filtering of the so-called AC and DC signal components in order to isolate the "alternating electric quantity" to be measured. Specifically, the Bosselmann et al reference uses a low pass filter such that the frequencies above the filter cutoff frequency contain all the information about this "alternating electric quantity" to be measured. In present invention, the frequencies below the filter cutoff frequency of a low-pass filter are the ones containing the information on the electric field to be measured. In fact in the present invention, the above-cutoff frequencies contain both amplitude and phase information about the electric field signals to be measured, as well as information on the temperature of the probe, while the frequencies above the cutoff frequency of a high-pass filter contain information about the temperature of the probe only.

In the present invention, the latter (i.e. the frequencies above the cutoff frequency of the high-pass filter) is used to compensate for the effects of temperature on the electric field information. None of the other cited patents use this technique. With respect to claims 7 and 16, the Bosselmann et al reference does not measure temperature from the optical output signal. With respect to claims 8 and 17, the Bosselmann et al reference does not simultaneously measure electric field and temperature from the output optical signal. With respect to claims 9 and 18, the Bosselmann et al reference does not sense a characteristic of the output optical signal containing temperature related information. With respect to 7, 9, 16, and 18, the Bosselmann et al reference uses a temperature-dependent function (which describes the change in e-o coefficient with temperature) to convert the measured, temperature-dependent signal "S1" or "S2" into the so-called "measured signal". The present invention uses a measured quantity (absorption of one specific portion of the optical signal, i.e., the part carrying only thermal information), to compensate for temperature effects on a different portion of the optical beam (i.e., the part carrying a combination of electric-field and thermal information). The Bosselmann et al reference a) converts a plurality of linearly polarized light signals into electric intensity signals; b) uses a plurality of photo-electric transducers for changing light signals to electric signals; and c) requires a plurality of normalizing means. The present invention has no such requirements, and in fact uses only one polarized light signal, one photo-electric transducer, and one normalizing means (which is fundamentally different from that employed by Bosselmann). Therefore the present invention is not anticipated, taught, or rendered obvious by the Bosselmann et al reference, taken singularly, or in any permissible combination. Reconsideration of the Examiner's rejection is requested.

Claims 3 and 12 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Erickson et al in view of Zhang et al (U.S. Pat. No. 5,952,818), or Bosselmann et al in view of Zhang et al. It is submitted that the present invention as recited in claims 3 and 12 are not rendered obvious by the cited combinations. In particular, the addition of the Zhang et al reference to the

primary references of either Erickson et al or Bosselmann et al does not overcome the deficiencies of the primary references as set forth in detail above. The Zhang et al reference is relevant only because it teaches that GaAs can be used for electro-optic measurements of electric fields. Even though it is true that GaAs is a candidate electro-optic crystal to be used for measuring fields, the physical principle used for temperature sensing and signal compensation for thermal effects is not mentioned in the Zhang et al reference. The uniqueness afforded by GaAs for measuring electric field and temperature, allowing for compensating the electric-field measurement for thermal effects, is only described in the present invention. Reconsideration of the Examiner's rejection is requested.

New claims 19-30 are submitted for the Examiner's consider and approval. The present invention as recited in claims 19-30 is not anticipated, taught, or rendered obvious by the cited references. In particular, the Erickson et al and the Bosselmann patents can not be used to measure the magnitude and phase of electrical signals, while the technique according to the present invention can distinguish these characteristics of an electric field signal. The present invention is to be used primarily for measuring radio frequency and microwave signals, either free-space or guided, while the Erickson patent states that it is applied only to high-voltage power lines. The materials listed by Erickson could not be used to sense temperature via the technique employed by the present invention, since the Erickson patent uses different physical principles. The Erickson patent thus could also not be used to simultaneously measure temperature and electric field in the same fashion as the present invention, nor to compensate the electric-field measurements for temperature effects in the same fashion as the present invention. The Erickson patent also teaches the use of "two photosensitive means to convert optical signals to electrical signals", while the present invention only uses one. The Examiner's consideration of new claims 19-30 is requested.

It is respectfully submitted that this Amendment traverses and overcomes all of the Examiner's objections and rejections to the application as

originally filed. It is further submitted that this Amendment has antecedent basis in the application as originally filed, including the specification, claims and drawings, and that this Amendment does not add any new subject matter to the application. Reconsideration of the application as amended is requested. It is respectfully submitted that this Amendment places the application in suitable condition for allowance; notice of which is requested.

If the Examiner feels that prosecution of the present application can be expedited by way of an Examiner's amendment, the Examiner is invited to contact the Applicant's attorney at the telephone number listed below.

Respectfully submitted,

YOUNG, BASILE, HANLON, MacFARLANE,
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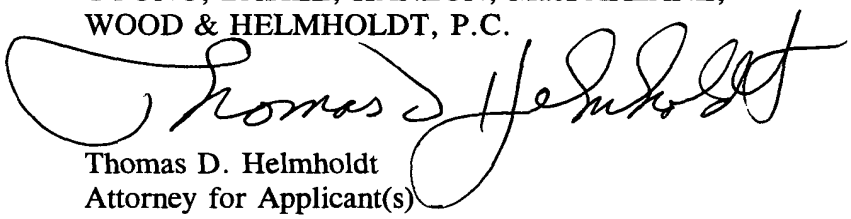

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